



Meet 61 distinguished Sandians

Sandia’s special appointments represent employees from all areas of the Labs’ operations. This year, 61 Sandians have been honored with special appointments, including Vincent Abeyta (2992), left, who has been promoted to the distinguished level of his job family. See all the 2014 special appointments on pages 6-7.

Three questions for Paul Hommert

Sometimes information just keeps on coming. In the past several months, Sandia has experienced its share of changes and challenges with the threat of a shutdown, budget cliffhangers, a new strategic plan, a contract extension, stepped-up initiatives, and increased volatility in the geopolitical sphere. The Lab News wanted to learn more, so writer Nancy Salem sat down with Laboratories Director Paul Hommert and asked a few questions. Just three, but these topics are on many Sandians’ minds. Here’s what Paul had to say.

The Budget

Sandia has seen budget increases, but at the same time, there is a sense that departmental spending is tight and expenses should be cut. What is the budget reality?

Paul Hommert: The budget reflects national priorities and their alignment in the mission space of the Laboratories. What we’re seeing right now in Washington is a high priority placed on the nuclear weapon modernization program. That priority aligns very strongly with the Laboratories’ mission capabilities — our mission responsibilities — so we benefit in budget space. Also a high priority is the broader set of national security challenges. Cyberspace is a great example of critical work that aligns well with the Labs’ capabilities. Our mission portfolio also addresses global nuclear dangers, nuclear assessments and

“So, yes, to accomplish our core mission work, we have a healthy budget. However, in this environment of increased cost pressures, the demands on us are greater than they’ve been in a generation.”



warning, and synergistic defense products — all of which, like cyber, are essential to sustaining our ability to fulfill our core NW mission. So, yes, to accomplish our core mission work, we have a healthy budget. However, in this environment of increased cost pressures, the demands on us are greater than they’ve been in a generation. We’re being asked to deliver simultaneously on three modernization programs; we’re working to complete production on a W76; and we’re trying to maintain our basic infrastructural capabilities. It’s a real challenge.
(Continued on page 5)



Carbon nanotubes

Researchers are developing new terahertz detectors based on carbon nanotubes that could improve medical imaging, airport passenger screening, food inspection, and other applications. Story on page 3.

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Engineered Safety

Case study— Identifying and safely controlling energy sources. It’s the kind of interesting problem often faced by Sandia’s Explosive Technology Group: How to safely work with a device carrying explosive powder. Story on page 11.



HOT SALT — A team of Sandia and AREVA engineers standing beneath a structure at the National Solar Thermal Test Facility examines the focal point of the sunlight reflected from the rows of mirrors on the ground to the top of the structure, where molten salt is flowing. The resulting heat is stored and used later when the sun is not shining. For more about this innovative solar energy project, see the story on page 4. (Photo by Randy Montoya)

That’s that

If you live in Albuquerque, you’ve been dodging, brushing away, trying not to inhale, and – alas – stepping on and driving over swarms of grasshoppers for the past several weeks. They just don’t seem to want to go away.

Local entomologists say the invasion is the worst since the 1990s, so bad that the swarms have been causing some strange radar blips over the Albuquerque metro area. Meteorologists at the National Weather Service were initially puzzled by the readings on their instruments: The pictures on their screens said rainstorm, but their training and experience said “no way!” Storm cells develop over time under some pretty well-understood processes. You can watch them evolve. But here were these massive rainstorms seeming to rise up over the city out of nowhere. After some head-scratching and troubleshooting, someone figured out what was going on: Grasshoppers, coming in off the drought-stricken plains and high deserts, were swarming, seeking the greener pastures of the middle Rio Grande valley. Borne by thermals and caught up in the high winds typical at this time of year, clouds of them were being lifted up to 2,000 feet in the air, plenty high enough to return a radar signature.

While the bugs have been a nuisance for most of us (although I have to say, they don’t really bother me that much; certainly not the way infestations of a certain strain of arthropods that shall go unnamed would bother me), I was wondering whether they were maybe more than a nuisance here at Sandia. Was the invasion affecting any experiments? Were the grasshoppers plugging up cooling systems, blocking solar collectors, taking up parking spaces, eating the landscaping around the cafeteria? Being the intrepid reporter I am, I emailed Stan Harrison, senior manager in our Facilities Management and Operations Center, for the scoop. After touching base with his team, Stan wrote back that the infestation wasn’t affecting operations at the Labs. So far, Stan said, “Sandians and grasshoppers are living in harmony.” But note the cautionary “so far.” That’s the voice of experience talking.

This latest natural phenomenon got me thinking again about something I’ve said over the years – maybe even said here in these pages: Our planet is a science fiction novel. Take the wildest, most inventive, sci fi story ever imagined, the most fully realized fictional universe ever depicted, and it doesn’t hold a candle to the strangeness, the fierce beauty, the wonder, the complexity of our home world. The levels of symbiosis and interdependence are breathtaking. This grasshopper invasion, the result of a cascading sequence of events – drought, a wet late summer monsoon season in 2013, a mild dry winter that didn’t kill off grasshopper eggs – is just one small reminder that, as naturalist John Muir wrote, "When we try to pick out anything by itself, we find it hitched to everything else in the Universe."

* * *

Veterans have been very much on our minds of late and that’s a good thing. Fact is, our debt to our veterans should never be far from our thoughts in any circumstances. What brings this to mind for me today is that I just learned Chester Nez has passed away at age 93. Nez, who lived in Albuquerque, was the last of the original 29 Navajo Code Talkers who developed the code that gave the Japanese fits during World War 2. It’s not a bit of a stretch to say that the role Nez and his fellow Code Talkers played helped ensure American victory in the Pacific campaign.

Because the Code Talker program was so secret, it was more than 20 years after the shooting stopped before Nez was allowed to tell his family what he had done during the war. Up until 1968, when the program was declassified, they only knew he had served in the Marine Corps.

An aside: Many Sandians can appreciate the special sacrifice that kind of secrecy entails: Your work is so important and so sensitive that you can’t tell even your closest loved ones, the ones you most want to take pride in your work, what you have done to serve the nation.

While Nez was the last of the original 29 Code Talkers, the program eventually involved several hundred Marines, some of whom are still alive today. But, like the members of the Greatest Generation who stormed the beaches at Normandy 70 years ago this week, they are passing away, passing from the history they helped to write. Their deeds will be remembered and honored long after they’re gone. In the meantime, if you know a veteran, any veteran, thank him or her today. Don’t wait for Veterans Day. Not this year. There just isn’t time for that.

See you next time.

Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)

First Kevin E. Strecker Award presented at Rice University

Sandia’s Combustion Research Facility (CRF) sends warm congratulations to Joseph Barchas of Rice University, the first recipient of Rice’s Kevin E. Strecker Award. Barchas received the \$2,000 award from the Department of Physics and Astronomy for developing its best master’s thesis, Electrostatic Energy Exchange in Shock Acceleration, which he worked on with professor Matthew Baring.

Created to honor the memory of Kevin, who received his PhD from Rice and was a valued member of the CRF staff when he died suddenly in 2012, the award is meant to recognize and encourage an outstanding student who is near the midpoint of studies toward a doctorate. The award is also a fitting tribute to Kevin, who was the 2004 recipient of the Wilson Award, offered by the department each year to the graduating doctoral student with the most outstanding PhD thesis.

Kevin’s wife, Michelle, who provided a generous gift toward the Kevin E. Strecker Award, noted that the money Kevin received for the Wilson Award was greatly appreciated at that time in their lives, and she welcomed the opportunity to return the favor while honoring Kevin.

Colleagues at the CRF have sorely missed Kevin, whom they admired for his scientific brilliance and treasured for his kind heart. At the time of his death, CRF’s Dave Chandler (8300) said, “He was one of the best and brightest — just a sponge for knowledge. At his core, Kevin wanted to understand the world and make a difference. He was an extremely kind person. People gravitated toward him because of his talents and approachability. It was all about moving forward; he helped everyone he came in contact with to reach their potential.”



KEVIN STRECKER

Talk business at the annual SS&TP open house

Representatives of companies in the Sandia Science & Technology Park (SS&TP) will be on hand during the park’s annual open house to talk about their businesses, technologies, and opportunities for collaboration.

The event is Tuesday, July 8, 11:30 a.m.-1 p.m., at the Steve Schiff Auditorium. Participating companies and organizations include AEgis Technologies, GAITS, Mazda Computing, MicroNet Solutions, MOOG, National Museum of Nuclear Science & History, New Mexico School for the Blind and Visually Impaired, Raytheon, RED Inc. Communications, Sumitomo Electric Device Innovations USA, TEAM Technologies, the QC Group, and Veritran. The open house is hosted by the SS&TP and sponsored by Sandia Laboratory Federal Credit Union. Light refreshments will be provided. For more information contact Michelle Gonzalez (7933) at 505-284-1722 or mjgonz2@sandia.gov.



Sandia National Laboratories
http://www.sandia.gov/LabNews

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Livermore, California 94550-0969
Tonopah, Nevada • Nevada National Security Site
Amarillo, Texas • Carlsbad, New Mexico • Washington, D.C.

Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corp., for the US Department of Energy's National Nuclear Security Administration.

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Classified ads 505/844-4902

Published on alternate Fridays by Media Relations and Communications Dept. 3601, MS 1468



Carlsbad students win LMCO scholarships for STEM studies



THREE CARLSBAD, N.M., AREA HIGH SCHOOL SENIORS have each been awarded a \$1,500 from Sandia National Laboratories/ Lockheed Martin to pursue science, technology, engineering, or math (STEM) majors in college. Lockheed Martin, on behalf of Sandia, distributes more than \$1 million to local communities in support of K-12 STEM education, veterans, and meeting basic human needs. Pictured here are, left to right, Alyssa Hendren from Loving High School, Courtney Alston from Carlsbad High School, Sandia Defense Waste Management Programs senior manager Paul Shoemaker, and Chase Kicker, from Carlsbad High School. (Photo by Desiree Kicker)

Improvements in MRIs, passenger screening, other image-detection applications on the horizon

By Mike Janes

Sandia researchers, along with collaborators from Rice University and the Tokyo Institute of Technology, are developing new terahertz detectors based on carbon nanotubes that could lead to significant improvements in medical imaging, airport passenger screening, food inspection, and other applications.

A paper to appear in *Nano Letters* journal, “Carbon Nanotube Terahertz Detector,” debuted in the May 29 edition of the publication’s “Just Accepted Manuscripts” section. The paper describes a technique that uses carbon nanotubes to detect light in the terahertz frequency range without cooling.

Historically, the terahertz frequency range — which falls between the more conventional ranges used for electronics on one end and optics on another — has presented great promise along with vexing challenges for researchers, says François Léonard (8656), one of the authors.

“The photonic energy in the terahertz range is much smaller than for visible light, and we simply don’t have a lot of materials to absorb that light efficiently and convert it into an electronic signal,” says François. “So we need to look for other approaches.”

Technology offers hope in medicine, other applications

Researchers need to solve this technical problem to take advantage of the many beneficial applications for terahertz radiation, says co-author Junichiro Kono of Rice University. Terahertz waves, for example, can easily penetrate fabric and other materials and could provide less intrusive ways for security screenings of people and cargo. Terahertz imaging also could be used in food inspection without adversely impacting food quality.

Perhaps the most exciting application offered by terahertz technology, says Kono, is as a potential replacement for magnetic resonance imaging (MRI) technology in screening for cancer and other diseases.

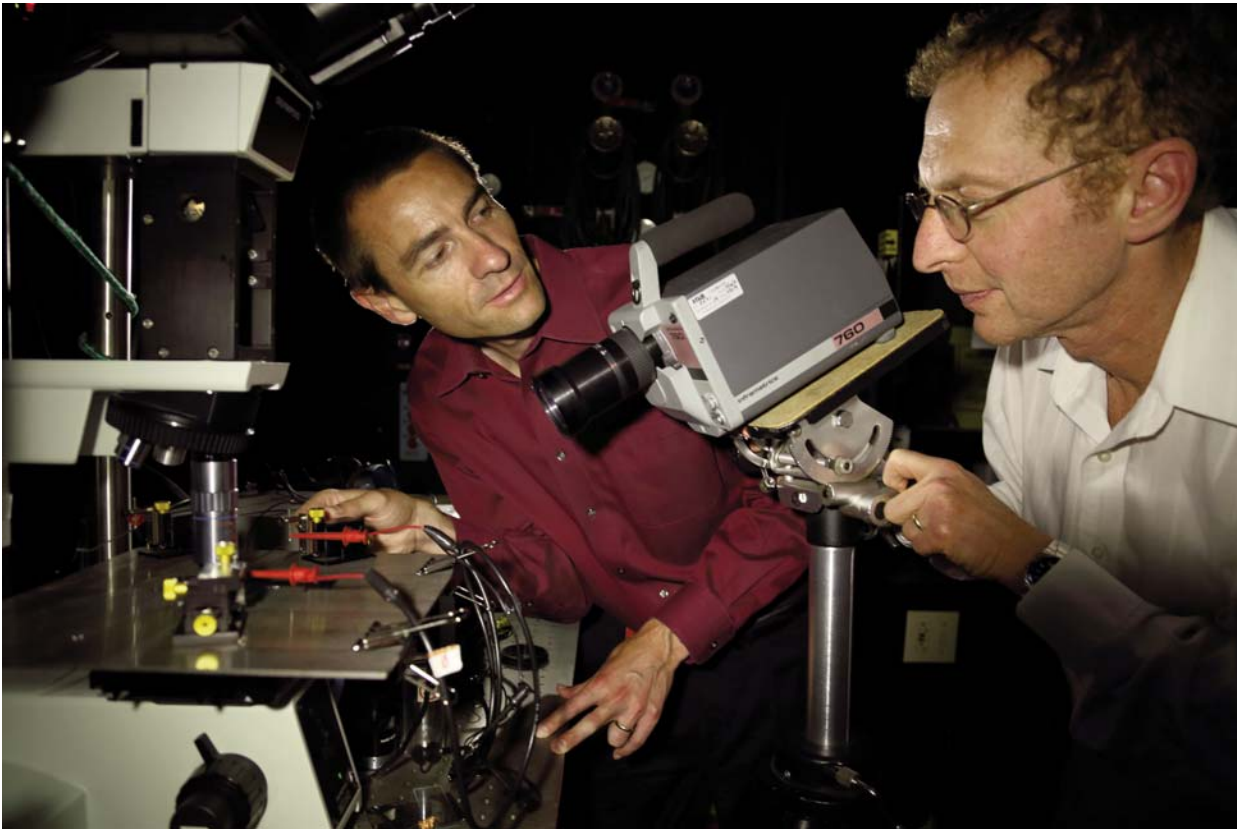
“The potential improvements in size, ease, cost, and mobility of a terahertz-based detector are phenomenal,” he says. “With this technology, you could conceivably design a hand-held terahertz detection camera that images tumors in real-time with pinpoint accuracy. And it could be done without the intimidating nature of MRI technology.”

Carbon nanotubes may help bridge the technical gap

Sandia, its collaborators, and François, in particular, have been studying carbon nanotubes and related nanomaterials for years. In 2008, François authored “The Physics of Carbon Nanotube Devices,” which looks at the experimental and theoretical aspects of carbon nanotube devices. (See the April 25, 2008, issue of *Sandia Lab News*.)

Carbon nanotubes are long, thin cylinders com-

“The potential improvements in size, ease, cost, and mobility of a terahertz-based detector are phenomenal.”



FRANÇOIS LÉONARD, LEFT, AND ALEC TALIN (both 8656) measure the thermal properties of a carbon nanotube terahertz detector using an infrared camera. Further technical improvements to the properties of the carbon nanotube material, François says, will lead to an even more effective design and performance of the terahertz detector that he and his collaborators have already achieved. (Photo by Dino Vournas)

Sandia California News

posed entirely of carbon atoms. While their diameters are in the 1- to 10-nanometer range, they can be up to several centimeters long. The carbon-carbon bond is very strong, so it resists any kind of deformation.

The scientific community has long been interested in the terahertz properties of carbon nanotubes, says François, but virtually all of the research to date has been theoretical or computer model based. A handful of papers have investigated terahertz sensing using carbon nanotubes, but those have focused mainly on the use of a single or single bundle of nanotubes.

The problem, François says, is that terahertz radiation typically requires an antenna to achieve coupling into a single nanotube due to the relatively large size of terahertz waves. The Sandia, Rice University, and Tokyo Institute of Technology research team, however, found a way to create a small but visible-to-the-naked eye detector, developed by Rice researcher Robert Hauge and graduate student Xiaowei He, that uses carbon nanotube thin films without requiring an antenna. The technique is thus amenable to simple fabrication and represents one of the team’s most important achievements, François says.

“Carbon nanotube thin films are extremely good absorbers of electromagnetic light,” he says. In the terahertz range, it turns out that thin films of these nanotubes will soak up all of the incoming terahertz radiation. Nanotube films have even been called “the blackest material” for their ability to absorb light effectively.

The researchers were able to wrap together several nanoscopic-sized tubes to create a macroscopic thin film that contains a mix of metallic and semiconducting carbon nanotubes.

“Trying to do that with a different kind of material would be nearly impossible, since a semiconductor and a metal couldn’t coexist at the nanoscale at high density,” says Kono. “But that’s what we’ve achieved with the

carbon nanotubes.”

The technique is key, he says, because it combines the superb terahertz absorption properties of the metallic nanotubes and the unique electronic properties of the semiconducting carbon nanotubes. This allows researchers to achieve a photodetector that does not require power to operate, with performance comparable to existing technology.

A clear path to performance improvement

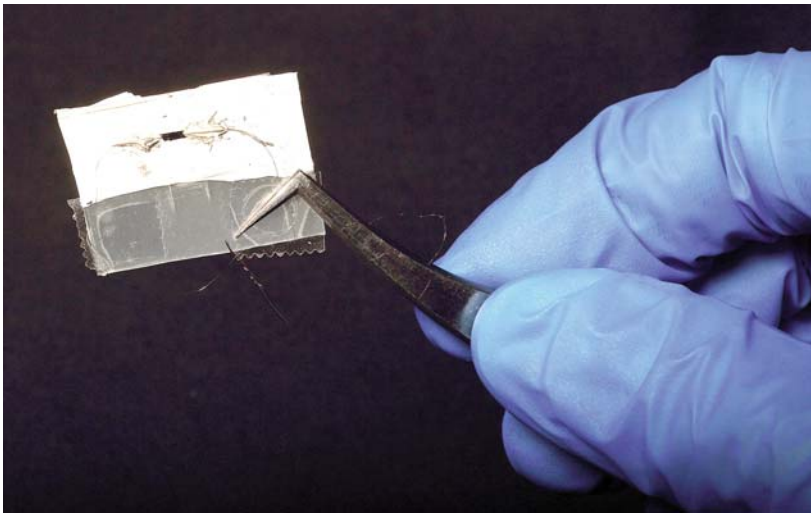
The next step for researchers, François says, is to improve the design, engineering, and performance of the terahertz detector.

For instance, they need to integrate an independent terahertz radiation source with the detector for applications that require a source, François says. The team also needs to incorporate electronics into the system, and to further improve properties of the carbon nanotube material.

“We have some very clear ideas about how we can achieve these technical goals,” says François, adding that new collaborations with industry or government agencies are welcome.

“Our technical accomplishments open up a new path for terahertz technology, and I am particularly proud of the multidisciplinary and collaborative nature of this work across three institutions,” he says.

In addition to Sandia, Rice, and the Tokyo Institute, the project received contributions from researchers taking part in NanoJapan, a 12-week summer program that enables freshman and sophomore physics and engineering students from US universities to complete nanoscience research internships in Japan focused on terahertz nanoscience.



RESEARCHERS AT SANDIA, Rice University, and the Tokyo Institute of Technology have developed a terahertz detector using several nanoscopic-sized tubes, creating a macroscopic thin film that contains a mix of metallic and semiconducting carbon nanotubes. (Photo by Dino Vournas)

Sandia California News

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- Bringing solar technology to the home
- High school girls recognized for math, science

AREVA building on Sandia's molten salt expertise

By **Stephanie Hobby**

A soaring structure on the south side of DOE's National Solar Thermal Test Facility (NSTTF) combines two cutting-edge technologies in concentrating solar energy: Compact Linear Fresnel Reflectors and molten salt thermal storage. Using them together is a pioneering concept.

Today's Compact Linear Fresnel systems use water or oil as the thermal fluid to capture heat from solar collectors. The hot fluid then heats water and converts it into superheated steam to drive a turbine connected to a generator that produces electricity.

With significant input from Sandia researchers, AREVA Solar designed the 100-foot-tall A-frame structure and Compact Linear Fresnel Reflectors, which are mirrors arranged in rows at ground level. The goal is to explore a different technology to collect and store heat generated by the reflectors in molten salt. If the system proves to be efficient and effective, AREVA, headquartered in Mountain View, Calif., will consider the technology for its solar plants around the world.

"Our goal is to demonstrate the viability and performance of a Linear Fresnel system that uses molten salt as a working fluid, thus allowing us to offer steam at higher temperatures (up to 585 degrees Celsius) and also deliver a cost-competitive storage solution for concentrating solar power projects," says Robert Gamble, general manager, North America at AREVA Solar.

AREVA Solar approached Sandia because of its unique Molten Salt Test Loop and Sandia researchers' accompanying expertise. The \$10 million Molten Salt Test Loop, known as MSTL, was completed in late 2012 and is the only test facility in the nation that can provide real concentrating solar power plant conditions and collect data to help companies make commercial decisions. Sandia

researchers have been testing components for external customers and have developed the expertise needed to help design and conduct experiments.

"A customer can come to us with an idea, and we have the knowledge to help them shape that idea into a working test," says engineer Bill Kolb (6123). "In the world of

AREVA's lead project engineer Antoine Bera.

In the early days of concentrating solar power, the industry was focused on generating steam to turn turbines, and there was not a lot of demand for thermal storage. Today, as the technology evolves, more companies are incorporating thermal storage into their designs. Molten salt is increasingly the medium of choice because it is affordable, abundant and stores thermal energy for long periods of time, providing greater flexibility for the electric grid.

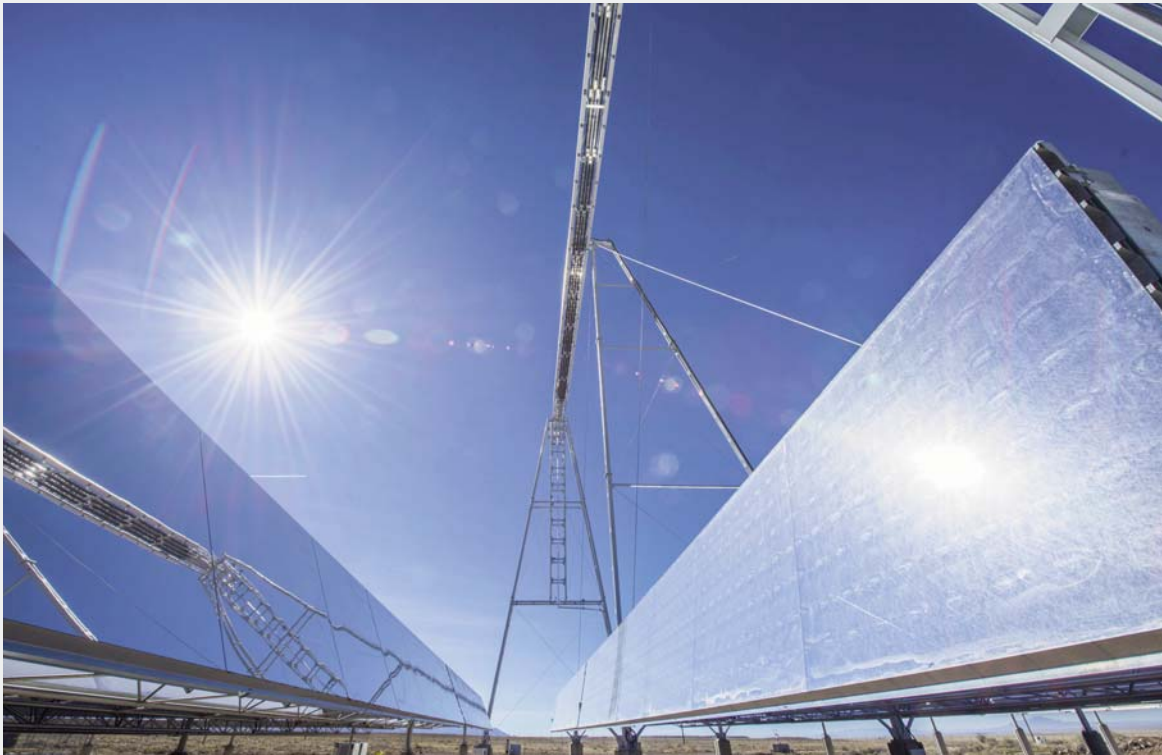
"This is enabling technology, and is providing a path to DOE's SunShot goals. Essentially, molten salt allows dispatchable electrical energy and reduces the leveled cost of energy, which is the advantage of using molten salt technology," says Concentrating Solar Technology department manager Subhash Shinde (6123).

Turning to Sandia was an easy choice, Gamble says. "Sandia's first-of-a-kind Molten Salt Test Loop, along with leading molten salt expertise, made it an obvious choice. Shared lessons learned and expert reviews from Sandia's molten salt experience in the fields of circulating molten salt, test-

ing valves, instruments, and freeze/thaw cycles have helped drive decisions in AREVA's research and design for molten salt and have proved the great value of this partnership," he says.

The construction portion of the project was led by Sandia Facilities Project Manager Scott Rowland (4822) and his team. "This was a big undertaking, from a technical and contractual standpoint," Scott says. "The customer, AREVA, was also the design team for the project. Our goal was to take molten salt from the facility and create a piping system 100 feet in the air with a football field of mirrors below to heat it even further. AREVA's previous installations had been done with water and steam so this was a design modification to their system."

The construction, commissioning, start-up, and initial testing have been completed, with further on-sun testing scheduled soon.



THESE MIRRORS at the National Solar Thermal Test Facility, called Compact Linear Fresnel Reflectors, are being used in conjunction with molten salt thermal storage in a pioneering approach to solar thermal energy production. (Photo by Randy Montoya)

molten salt, this is where you come for expertise."

Compact Linear Fresnel Reflectors are attractive because they can generate a large amount of heat cost-effectively, using comparatively small land area. The mirrors are aligned to focus the sun's reflected light at the top of the structure, which houses stainless steel receiver tubes through which the molten salt is pumped and then returned to a hot tank of salt, which can be used later to produce electricity. The receiver tubes are at the focal point of the series of mirrors, and then an additional set of mirrors across the top of the tubes captures and refocuses any sunlight that doesn't directly hit the tubes, taking advantage of all available sunlight.

"This really is based on an industry need for thermal storage, so what we have here is a proof-of-concept demonstration project, aimed at an industry need. The idea is all the feedback and lessons we learn will be fed into our optimized design for the power industry," says

Institute on jointed structures attracts international participation

By **Neal Singer**

The 2014 Nonlinear Mechanics and Dynamics Summer Research Institute, slated to begin on July 7, will bring researchers from around the world to Sandia to study how to predict the behavior of jointed structures in bridges, buildings, and other structures where failure can be catastrophic.

Twelve participants from nine institutions in five countries are expected to take part in the six-week institute, says Matt Brake (1526), co-organizer of this year's effort with researchers from the University of Stuttgart in Germany and Imperial College, London.

"This summer institute provides researchers an opportunity to develop lasting collaborations that go beyond what's possible from limited interactions at annual conferences," says Matt. "Since experts in this field are dispersed internationally, it takes an effort like this to bring everyone together to cultivate new ideas and approaches."

In addition to the eight Sandians giving talks or helping organize the meeting, six outside speakers will present talks and two more will take part in institute discussions.

The goal is to bring together participants with diverse technical backgrounds from around the world. Working in small teams, they will predict various aspects of how jointed structures react to stress or shock, a subject of particular interest at Sandia.

Because failures of jointed structures like chairs or tables haven't caused much alarm worldwide, "The majority of people involved in our project come from aerospace applications for planes and turbine engines, and civil applications such as bridges, dams, and nuclear power plants," says Matt.

Researchers in two theoretical projects are assessing how best to simulate complex systems with strong nonlinearities and assess uncertainty in large data sets in those systems. Experimental projects will assess the effect of measurement on joint behavior predictions, and causes of variability and non-repeatability in measurements.

For example, says Matt, "How a joint will perform in different environments is a question we need to answer for predictive modeling. We could try building a mesh with millions of degrees of freedom, but simulating that with the necessary number of elements to get convergence is going to be prohibitively expensive in computer resources. It will also give no guarantee of predicting the correct answer because we



Nonlinear Mechanics & Dynamics Summer Research Institute

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are limited by the physics built into the numerical codes. There are a number of multi-scale phenomena that we don't fully understand, and we have evidence that some set of physics is missing from our simulation capabilities.

"The projects that we'll be working on this summer are a step toward understanding how to compensate for the missing physics in terms of uncertainty modeling, and how to develop a methodology to ascertain what the missing physics are."

An important goal of the collaborations is to develop a predictive model of joint behavior that represents just the joint, with only a few degrees of freedom, within the high-fidelity model of the system. This would allow the system model itself to contain only thousands of degrees of freedom rather than millions for calculations to converge to a reasonable result. This reduction in degrees of freedom would allow an analyst to predict system behavior and assess margins of uncertainties for systems with joints in just a few days of work with a desktop computer, instead of what might take years on a supercomputer.

In addition to his Sandia duties, Matt also serves as secretary of the American Society of Mechanical Engineers' Research Committee on the Mechanics of Jointed Structures.

Three questions for Paul Hommert

(Continued from page 1)

lenge. It's really quite remarkable, in my view, that we are delivering these efforts on budget, actually under budget, and on schedule. This achievement bears testimony to the work of our staff and to the tools we've put in place in the stockpile stewardship program. Nonetheless, the environment is stressful.

There are factors today that place more demands on every budget dollar than in the past. For example, in 1987 — just to pick a year — we weren't dealing with many of the current business realities we now face: Healthcare costs were not what they are today, relatively speaking, and we had zero pension contributions to make. I ought to note, too, that we're now dealing with the oldest stockpile the country's ever had. In 1987, it was an essentially new stockpile. We didn't have the same requirements for surveillance, and we didn't have to worry about aging components. In 2014, however, we're looking at a stockpile that has aged. The age of the components and the need for different surveillance requirements have therefore acquired profound significance. It's new territory for the country, and for us it brings new demands that have their own costs.

And managing the costs is always a challenge. There's no magic wand that would suddenly allow you to save significant amounts of money. For example, we have produced significant savings with IT consolidation. We realized it was more productive to get rid of servers dispersed all over the Laboratories and consolidate them. It was more productive, more reliable, and really a better use of our talent. Another good example is facilities planning. We're putting up some new buildings so that we can take down older facilities that incur large deferred maintenance costs and are in constant need of attention. We're trying to find those win-win situations that make us more effective and allow us to save money.

We also see our cost-effectiveness in the way we're managing our healthcare benefits, a challenging and dynamic area where changes happen fast. I think we've done a great job with wellness programs, developed for the good health of all our employees. We've invested a little bit of money that allows us to save money in the long run and become more effective. Investing to save is the kind of thing I want to see us do. I want to avoid blanket cuts.

All this suggests that while the budget looks good, the demands are unprecedented. Looking back — and I'm going here all the way back to the Cold War — I cannot find a period when as much was being asked of us as is being asked of us today. We're rising to that challenge, but because of the fiscal climate in the country, there's a heightened level of scrutiny and higher expectations for cost-effectiveness.

But it is also important to maintain a good balance between the need to be cost-effective and the need to spend the necessary resources on benefits that make us attractive to top candidates. I do believe that we've done a great job of attracting and retaining the best, but we must be able to continue doing so. We must keep benefits and educational support strong because they are among those things that people see as truly valuable for our environment. Regardless of our current budget situation, we have an obligation to return the most value to the taxpayers. We should hold ourselves to the best standards of cost-effectiveness, and we're doing a pretty good job of that.

The Strategic Plan

The FY14-FY18 Strategic Plan has major changes around mission areas and Program Management Units (PMUs). What was the thinking behind the new approach?

Paul Hommert: We are the largest of the DOE laboratories, and the most diverse in terms of the mission we execute. We evolved that way because of the nature of our core and capabilities. I felt that, as we went forward in the current environment of scrutiny and expectation, we needed to better articulate, first to ourselves but also to our stakeholders, how we think strategically about the mission space of the Laboratories.



THE NEW LABORATORIES FRAMEWORK provides a basis for describing Sandia's mission and capability space and for prioritizing the work of the Laboratories. Three key characteristics — synergy with nuclear weapons capabilities, national security impact, and strategic value to the nation to ensure Sandia's enduring impact — were used to identify seven integrated missions, in addition to the nuclear weapons core mission. Together, all eight mission areas are supported by a robust foundation that enables Sandia's success as a sustainable 21st century, broad-spectrum national security laboratory.

And that strategy has to go back to our roots to reaffirm our unique and fundamentally important role for the country in nuclear weapons. It also must allow us to tell the story of why we do the broader work we do, why it's important to that first mission space, and why and how it should translate into steering the Laboratories' capability base forward to enhance these efforts.

So, the recent strategic plan journey has been about articulating mission space strategically by defining mission areas, while reinforcing and making clear the fundamental position of nuclear weapons. The FY14-FY18 Strategic Plan [http://strategicplan.sandia.gov] resulted from two years of extensive reexamination of our mission space and the foundational capabilities that enable mission success — as outlined in our FY12-FY16 Strategic Plan — in order to amplify our national security impact. What emerged from those discussions was a new Laboratories framework for describing the mission and capability space of the broader Labs we have become.

Recent events have demonstrated the continuing importance of nuclear weapons to the country in the post-Cold War, post-9/11 world. But at the same time, it's such a complex national security landscape that our capabilities and our people can be sustained only through the symbiotic relationship between the nuclear weapons mission and other national security missions. And so the framework we've laid out highlights the interrelationship and mutual dependence between the other work we're doing and the core mission. It's not a lot more complicated than that.

The mission areas are our strategic way of integrating long-term plans, resources, and capabilities across the Laboratories. The balance between the broad landscape and our mission focus is dynamic and goes beyond the PMU's strong customer focus. So, when I talk about cyber as a mission area, for example, I don't have to mirror the very complex Washington cyber funding landscape. Instead, we can focus on how the Laboratories can best deliver excellence in cyber to a range of customers supported by the PMUs. That's what an FFRDC (federally funded research and development center) should do in order to enable us to look over the horizon strategically with a broad view of the national security landscape.

Now our leadership challenge is how to operationalize this framework, beginning with the change from SMU (Strategic Management Unit) to PMU (Program Management Unit). This name change reflects a structural change intended to emphasize that the Labs' overall mission strategy resides in the mission area framework while effective management of our programmatic commitments occurs through the PMUs, where we have

also retained an emphasis on the customer environment in Washington.

But we have details to work through. All our mission area leaders are working to complete what will be our first generation of strategic plans by the end of June. Those plans are intended for the long term as we grapple with questions like these: What are the nation's needs? What capabilities do we have? How do we couple those needs with our capabilities? We're anxious to see the plans, and we're eager to see how well they will position us to decide on an emphasis for our capability base and programmatic activities.

While I don't expect that this new framework will change what members of the workforce experience on a day-to-day basis, I hope that, as they reflect on it, they can understand that there's logic to the way in which the mission areas piece together to form the framework of our institution. Our successes or our failures in any one area reflect on the Labs as a whole.

I want to thank our center directors who worked on the new mission area framework. In addition to having described eight mission areas, they articulated nine major capabilities for the Labs. The mission areas derive from our capabilities — people and facilities — and from our research. Let me repeat, it's a powerful concept. I sat down recently with Sen. Martin Heinrich in his office in Washington. He's an engineer, he knows the Labs pretty well. And I showed him the illustration of our framework (see image at left). It was a picture with which he resonated and to which he could respond positively. I knew we needed a better way to talk about capabilities, but I had

no idea what we'd get. We got a fabulous product. However, it's a start, and I look forward to seeing it flourish in the future.

Safety

Efforts to make Sandia a safer place to work have stepped up. Managers are meeting, Engineered Safety was launched, and stronger messages are emerging. What is behind the safety push?

Paul Hommert: We've been on a long journey with respect to strengthening safety at the Laboratories, a journey of 25-plus years. And we've made great strides, there's no question about it. But the fact remains that many incidents in the past five years or so would indicate that we've not yet achieved culturally the level of excellence we wish to have. I believe passionately that the Engineered Safety framework overcomes earlier impediments. It demonstrates that excellence in our mission, which is deeply held at the institution and something we all should be proud of, is not separable from excellence in safety.

The two have not always been merged. Safety has sometimes been thought of as an add-on, something extra. The framework of Engineered Safety says deeply to us that safety is integral to the way we deliver excellence. And that's why it is so important to me that we take what I hope is a critical big step on this journey, making safety integral to mission excellence. And we haven't always made that clear.

Our powerful new framework ensures the integration of safety and mission success by highlighting and supporting critical thinking. While documentation must support critical thinking, which has been an integral component of our mission delivery for more than 60 years, it's not all about paperwork. In March, I held a series of Engineered Safety discussions with more than 900 leaders at the Laboratories to emphasize the importance of integrating Engineered Safety into all the components of mission and mission support work.

I urge every member of our workforce to engage and have this conversation with his or her immediate leaders because the way in which Engineered Safety plays out is slightly different in every single part of the Lab. But the essence is the same everywhere. And I really hope we can get to a different place. I am optimistic because I see places in the Labs that just amaze me when I realize how well they have internalized Engineered Safety. We need to celebrate those safety successes, make them more prominent, make people understand that that's what we want to see, that's what we value.

61 Sandians move into Distinguished ranks

Sandia’s special appointments represent employees from all areas of the Labs’ operations. According to Corporate Policy System documentation, placement in the Distinguished level signifies a promotion to the fourth level of the job. This level is to be populated with a few exceptional employees who have distinguished themselves in their careers while at Sandia. This level is different from the other levels in that it is subject to a 10 percent population limitation to preserve the distinction of the level. Divisions are not obligated to fill all their distinguished “slots.”

Employees selected for the new levels have been recognized with a special plaque and a nonbase salary award, in addition to this special mention in the *Lab News*. Also pictured here are individuals appointed to the very select title of senior scientist/engineer or senior administrator, a unique recognition of professional accomplishment. Not pictured here are John Ford (1816), Jean-Paul Watson (1464), Joseph S. Sandoval (6513), Denise Borrego (10653), and Cheryn Lingerfelt (10507).

Photos by Lloyd Wilson and Stephanie Blackwell (New Mexico) and Randy Wong (California)

Division 1000



Steven Beresh 1515
Mechanical Engineering



Brad Boyce 1831
Materials Science



David Campbell 1767
Electronics Engineering



Malcolm Carroll 1725
Electronics Engineering



Grant Grossetete 1766
Laser/Optical Technologist



Stephanie Hansen 1684
Physics



Terry Hargett 1131
Laboratory Support Technologist



Eric Keiter 1355
Computer Science



Debra Kirschner 1300
ES&H Generalist



Barbara McGuire 1741
ES&H Technologist



Bonnie McKenzie 1819
Laboratory Support Technologist



Penny Moore 1747
Microelectronics/Semiconductor Technologist



Tommy Mulville 1651
Laboratory Support Technologist

Division 2000



Vincent Abeyta 2992
CAD/Drafting Technologist



Richard Apodaca 2557
Engineering Support Technologist



Nathan Brannon 2223
Systems Engineering



Jim Brown 2613
Mechanical Engineering



Edward Bujewski 2714
Nuclear Engineering



Robert Galloway 2222
Mechanical Engineering



Moses Jones 2714
Engineering Support Technologist



Saskia King 2714
Nuclear Engineering



Jonathan Leonard 2546
Laboratory Support Technologist



Gerald Prudencio 2999
CAD/Drafting Technologist



Richard Scarine 2915
Systems Engineer



Matthew Senkow 2735
Engineering Support Technologist



Carla Weatherred 2244
Engineering Support Technologist



Michael Willis 2556
Laboratory Support Technologist

Division 4000



Bernard Argo 4879
Facilities Technologist



Ralph Cipriani 4853
Strategic Planner



Ralph Fevig 4122
Safety Engineer



Roy Gideon II 4821
Facilities Technologist



Ronald Rymarz 4844
Facilities Technologist

Division 5000



Brian Thomson 4128
Health Physicist



Steve Trujillo 4824
Facilities Technologist



William Miller 5900
Senior Scientist/Engineer



John Williams 5700
Senior Scientist/Engineer

Division 6000



Rossitza Homan 6813
Engineering Program/Project Lead

Division 8000



Mark Brynildson 8517
Environmental Technical Professional



Carrie Burchard 8539
Business Development



Tamara Sue Cagney 8527
Licensed Mental Health Counselor



Jennifer Chan 8244
Systems Engineering



David Dirks 8944
Solutions Architect

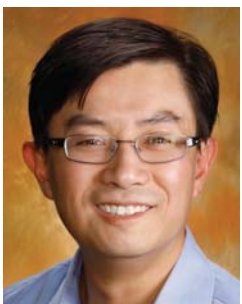


Tara Lynn Hartley 8522
Human Resources Support



Patricia Hough 8954
Computer Science

61 Sandians move into Distinguished ranks



Alvin Leung 8248
Systems Engineering



Ratish Punnoose 8229
Microwave & Sensor Engineering



Marilyn Romo-Hamilton 8949
General Technologist



Christopher San Marchi 8252
Science & Engineering



Corbin Stewart 8944
Computer Software Engineering Technologist



Luis Paz 256
Systems Engineering

Org. 2



Tanya Gallegos 10628
Business Management Professional



Kimberly Hallatt 10508
Financial Policy and Compliance Accountant



Shawn Littleford 10628
Financial Support



Richard McLendon 10600
Senior Administrator



Donna Robertson 10620
Quality-Business Processes Specialist



Lynne Starkweather 10655
Business Management Professional

Division 10000

Sandia total rewards package keeps employees and the Labs healthy



It's a truth universally acknowledged that healthcare costs are rising while health risks are worsening. The average US employee has seen a 222 percent increase in out-of-pocket and payroll contributions for healthcare expenses during the last 10 years, and at the same time, about 67 percent of the population is overweight or obese.

At Sandia, the story is different. Our employees are paying less for their healthcare than the national average while improving their health and reducing their risk. The effort is paying off — data show that as a whole Sandia is beating national health trends. While the number of Americans who will be overweight or obese is projected to increase to 86 percent by 2030, Sandians are working to stay healthy. We must continue to be vigilant and work together to control costs and manage health. Analysts forecast that healthcare costs will continue to rise at more than twice the rate of inflation.

The 8-15-80 model

To promote and encourage a healthy workforce, HBE bases its preventive health programming on the 8-15-80 model: preventing or improving eight modifiable risks and behaviors that drive the 15 chronic conditions that account for 80 percent of the total cost of chronic illness.

Sandia employees have built a culture of health during the last 20 years with almost 100 percent of the workforce participating in at least one of the offered health and wellness services. From Health Action Plans to allergy shots and urgent care services, there's something for almost any interest.

Our onsite health and wellness programs represent only one aspect of the total rewards package. When we talk about total rewards at Sandia, we mean a comprehensive and holistic approach to employee health, wellness, benefits, financial resources, and recreation. Through our total rewards package employees can:

- **Maintain and improve health** — through medical, dental, and vision benefits and onsite health and wellness programs.
- **Protect against the unexpected** — through life insurance and disability coverage.
- **Save money for the future** — through retirement savings plans and financial adviser programs.

- **Enhance leisure time** — through sports associations, entertainment discounts, recreation equipment rental, and special interest workshops.

To find out more about services and programs, visit hbe.sandia.gov or schedule an annual well check with our HBE Health Management Clinic for one-on-one guidance on setting health goals. Look for additional articles in future editions of the *Lab News* — we'll explore ways you can use your benefits to save time and money, get and stay healthy, and more.

Commit to do one good thing for your health this summer

Health Action Plans

HBE's Health Action Plans are designed to help employees target one of the key health risks identified through the 8-15-80 model, including tobacco use, inadequate sleep, excessive stress, weight loss, physical inactivity, hypertension, high cholesterol, diabetes, heartburn, low back pain, allergies, and goal-setting. By signing up for a Health Action Plan, employees can get connected with HBE's onsite registered dietitians, fitness professionals, health coaches, and physicians to get coaching, support, and build the skills they need to implement health and lifestyle changes. Health Action Plans are also an opportunity for employees to earn Health Reimbursement Account (HRA) funding by earning Virgin Pulse HealthMiles. Enroll today at healthactionplan.sandia.gov.

Get ready for the computers of the future

Sandia launches push to innovate next-generation machines

By Sue Major Holmes

Computing experts at Sandia have launched an effort to help discover what computers of the future might look like, from next-generation supercomputers to systems that learn on their own — new machines that do more while using less energy.

“We think that by combining capabilities in micro-electronics and computer architecture, Sandia can help initiate the jump to the next technology curve sooner and with less risk,” says Div. 1400 Director Rob Leland. He has outlined a major Research Challenge into next-generation computing called Beyond Moore Computing, part of Sandia’s overall work on future computing.

For decades, the computer industry operated under Moore’s Law, named for Intel Corp. co-founder Gordon Moore, who in 1965 postulated it was economically feasible to improve the density, speed, and power of integrated circuits exponentially over time. But speed has plateaued, the energy required to run systems is rising sharply, and industry can’t indefinitely cram more transistors onto chips.

The plateauing of Moore’s Law is driving up energy costs for modern scientific computers to the point that, if current trends hold, more powerful future supercomputers would become impractical due to enormous energy consumption.

Solving that conundrum will require new computer architecture that reduces energy costs, which are principally associated with moving data, Rob says. Eventually, computing also will need new technology that uses less energy at the transistor device-level, he adds.

Sandia experts expect multiple computing device-level technologies in the future rather than one dominant architecture. About a dozen possible next-generation candidates exist, including tunnel FETs (field effect transistors, in which the output current is controlled by a variable electric field), carbon nanotubes, superconductors, and fundamentally new approaches such as quantum computing and brain-inspired computing (See story on page 9).

Sandia’s facilities will play key role in researching future computing technology

Sandia is well-positioned to work on future computing technology due to its broad and long history in supercomputers, from architecture to algorithms to applications. Rob says Sandia can play a key role because of that background and two key facilities: the Microsystems and Engineering Sciences Applications (MESA) complex, which performs multidisciplinary microsystems research and development and fabricates chips to test ideas; and the Center for Integrated Nanotechnology (CINT), a DOE Office of Science national user facility operated by Sandia and Los Alamos national laboratories.

No one is sure what tomorrow’s high performance computers will look like. “We have some ideas, of course, and we have different camps of opinion about what it might look like, but we’re really right in the midst of figuring that out,” Rob says.

Erik DeBenedictis (1425) says Sandia can play an important role in creating breakthroughs that are not

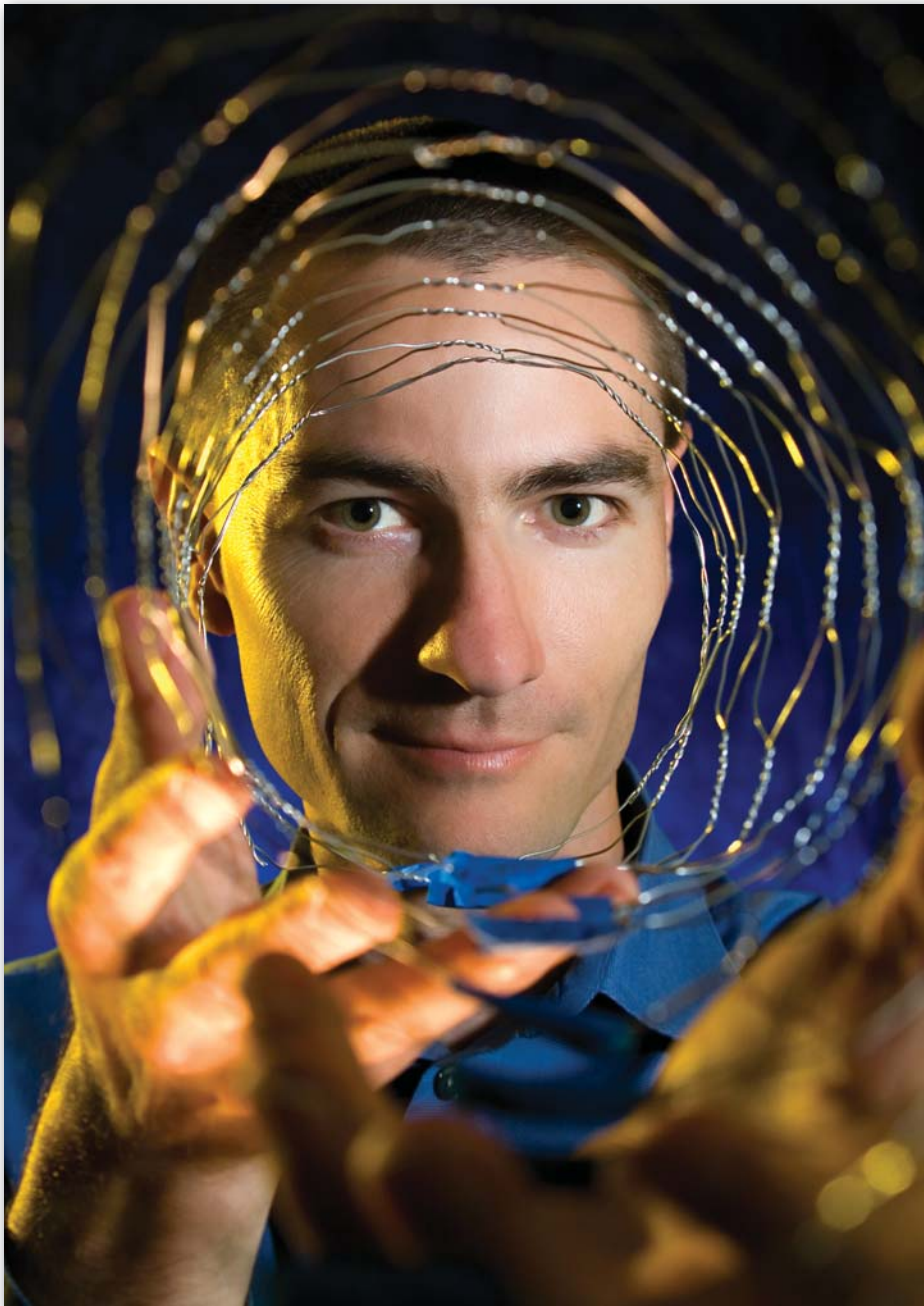
simply variations of transistors — developments such as computers that learn or technologies that move data from one part of the computer to another more efficiently. Those are crucial for big data problems.

What ultimately prevails might well be something not yet invented, Rob says.

“That’s the first challenge, to figure out what the new device technology is, then work through what the implications of that are, what sort of computer architecture is required to assemble that device into components and subsystems and systems,” he says.

New technology must be broadly adopted to drive improvements

Sandia needs both capability computing, which means finer resolution and more accuracy, and capacity computing, or running many different jobs simultaneously.



PREPARING FOR FUTURE COMPUTING — François Léonard (8656) holds a wire mesh cylinder similar in design to a carbon nanotube that might form the basis for future computing technology. Experts at Sandia are exploring what computers of the future might look like — new types of machines that would do more while using less energy. (Photo by Randy Wong)

“So what does efficiency buy you? It allows you to have a bigger computer or more computers with the same amount of operating expense — paying your power bill,” says manager John Aidun (1425). “There’s no limit to the amount of efficiency we would like to achieve because really there’s no limit to the amount of computing we would like to do.”

Whatever technology comes next must be broadly adopted so it will drive continual improvements, similar to the way the 1947 invention of the transistor transformed society. It’s not enough to have a device that’s fast; it has to be something that can be built into a complete computer system, John says.

Thus, new technology must have commercial uses. “There will have to be some industrial base that supports it and produces it and that can be used to assemble a large number of these into a system that can be deployed for national security,” Rob says. “What we’d really like to do is figure out how to advance the state of the art for national security in a way that is more broadly deployable across society.”

The computer industry is exploring technologies

that in essence are drop-in replacements for transistors with improved characteristics: different designs such as the fin FET, a 3-D rather than a flat configuration on a computer chip, John says. While the design would be moderately disruptive for industry, it’s still compatible with standard silicon fab technology and opens the potential for generations of ever-smaller FinFETs on a chip, he says.

While industry views a beyond-transistor technology as something far off, Sandia’s national security interests anticipate bigger changes will be needed sooner than industry would develop them on its own, John says. He estimates Sandia could have a prototype new technology within a decade.

Identifying best computer designs can help accelerate innovation

To accelerate the process, Sandia wants to identify computer designs that could take advantage of new device technologies and demonstrate key components or steps in fabrication that would lower the risk for industry by demonstrating technological feasibility.

“We’d be doing it with an eye toward helping industry give due attention to national security needs in computing,” John says.

The numerical capability developed in computers in World War II remains valuable today for such tasks as nuclear weapons simulations. But the modern era’s largest computing development, the Internet, deals with text and demands computing functions called integer calculation, also used in mobile computing.

Improving mobile computing could allow much more efficient and rapid data processing aboard satellites, so less data would need to be sent to Earth for processing.

“The mobility we see in cell phones and tablets is the closest match for the mobility needs of UAVs and satellites,” Erik says. “The energy and time required to transmit data to the ground, process it there, and send the answer back is a bottleneck, and it can be more resource-intensive than just computing on the device.”

He also suggested turning more programming over to cognitive computers to help programmers manage ever-faster computers. “While computers have gotten millions of times faster, programmers and analysts are pretty much as efficient as they’ve always been,” he says.

Cognitive computing can play role in pattern recognition

Cognitive computers might be able to do more to recognize patterns in satellite imagery, for example. People would still make the judgments, but computers would help by recognizing some lower-level patterns, he says. Up to now, programmers have created ways for computers to recognize images; computers didn’t learn on their own. A cognitive computer, however, would learn to identify patterns, Erik says.

“A computer can learn to recognize images pretty well. Humans assisted by a computer recognizing images could improve the ability significantly,” he says.

Researchers also must determine what hardware and software changes are needed so new devices are possible to manufacture and practical to operate. “You have to design over all those different considerations,” Rob says. “That’s what makes this a particularly challenging problem.”

Today’s computer systems rely on huge, longstanding investments in massive amounts of software.

“So we are strongly motivated to develop computers that will run old software that was optimized for traditional computer architectures that are not used today,” Erik says. “To break out of that, we have to find different architectures that are more energy-efficient at running old code and are more easily programmed for new code, or architectures that can learn some behaviors that once required programming.”

Since the software of today won’t unleash the full capabilities of the hardware of tomorrow, he expects computers in about a decade that can run both today’s software and new software. New software “would learn or would process information in fundamentally different ways, and become the most powerful aspect of the computer over time,” he says.

The brain: Key to a better computer

By Sue Major Holmes

Your brain is incredibly well suited to handling whatever comes along, plus it's tough and operates on little energy. Those attributes — dealing with real-world situations, resiliency, and energy efficiency — are precisely what might be possible with neuro-inspired computing.

"Today's computers are wonderful at bookkeeping and solving scientific problems often described by partial differential equations, but they're horrible at just using common sense, seeing new patterns, dealing with ambiguity, and making smart decisions," says manager John Wagner (1462).

In contrast, the brain is "proof that you can have a formidable computer that never stops learning, operates on the power of a 20-watt light bulb, and can last a hundred years," he says.

Although brain-inspired computing is in its infancy, Sandia has included it in a long-term research project whose goal is future computer systems. Neuro-inspired computing seeks to develop algorithms that would run on computers that function more like a brain than a conventional computer.

"We're evaluating what the benefits would be of a system like this and considering what types of devices and architectures would be needed to enable it," says microsystems researcher Murat Okandan (1719).

Sandia's facilities and past research make the Laboratories a natural for this work: its Microsystems & Engineering Science Applications (MESA) complex, a fabrication facility that can build massively interconnected computational elements; its computer architecture group and its long history of designing and building supercomputers; strong cognitive neurosciences research, with expertise in such areas as brain-inspired algorithms; and its decades of work on nationally important problems, John says.

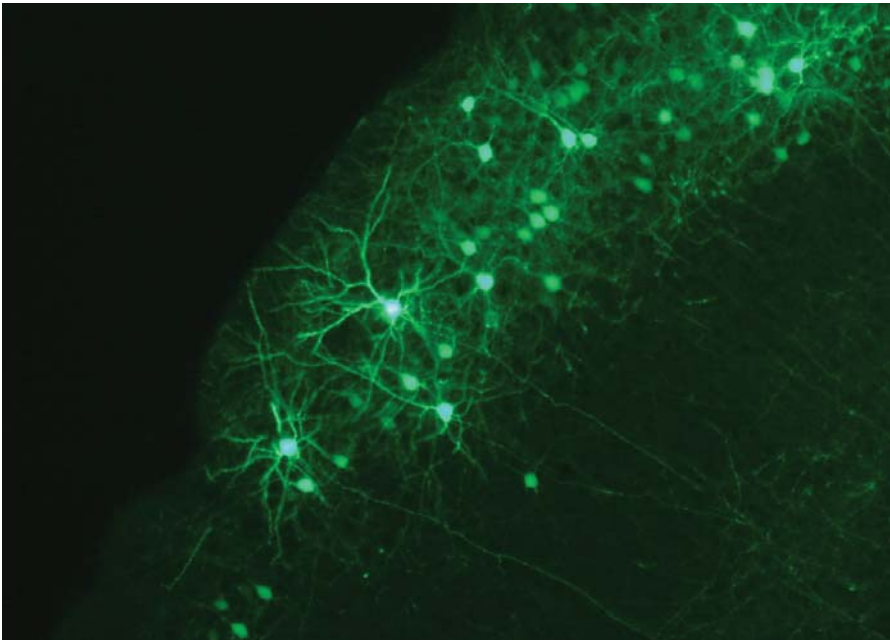
New technology often is spurred by a particular need. Early conventional computing grew from the need for neutron diffusion simulations and weather prediction. Today, big data problems and remote autonomous and semiautonomous systems need far more computational power and better energy efficiency.

Ideal for robots, remote sensors

Neuro-inspired computers would be ideal for operating such systems as unmanned aerial vehicles, robots, and remote sensors, and solving big data problems, such as those the cyber world faces, and analyzing transactions whizzing around the world, "looking at what's going where and for what reason," Murat says.

Such computers would be able to detect patterns and anomalies, sensing what fits and what doesn't. Perhaps the computer wouldn't find the entire answer, but could wade through enormous amounts of data to point a human analyst in the right direction, Murat says.

"If you do conventional computing, you are doing exact computations and exact computations only. If you're looking at neurocomputation, you are looking at history, or memories in your sort of innate way of looking at them, then making predictions on what's going to happen next," he says. "That's a very different realm."



INSPIRED BY THE BRAIN — Sandia researchers are drawing inspiration from neurons in the brain, such as these green fluorescent protein-labeled neurons in mouse neocortex, with the aim of developing neuro-inspired computing systems.

(Photo by Frances Chance, courtesy of Janelia Farm Research Campus)

"The ultimate question is, 'What are the physical things in the biological system that let you think and act, what's the core essence of intelligence and thought?'"

Modern computers are largely calculating machines with a central processing unit and memory that stores both a program and data. They take a command from the program and data from the memory to execute the command, one step at a time, no matter how fast they run. Parallel and multicore computers can do more than one thing at a time but still use the same basic approach, and remain very far removed from the way the brain routinely handles multiple problems concurrently.

The architecture of neuro-inspired computers would be fundamentally different, uniting processing and storage in a network architecture "so the pieces that are processing the data are the same pieces that are storing the data, and the data will be processed with all nodes functioning concurrently," John says. "It won't be a serial step-by-step process; it'll be this network processing everything all at the same time. So it will be very efficient and very quick."

Unlike today's computers, neuro-inspired computers would inherently use the critical notion of time. "The things that you represent are not just static shots, but they are preceded by something and there's usually something that comes after them," creating episodic memory that links what happens when. This requires massive intercon-

nectivity and a unique way of encoding information in the activity of the system itself, Murat says.

More possibilities

Each neuron in a neural structure can have connections coming in from about 10,000 neurons, which in turn can connect to 10,000 other neurons in a dynamic way. Conventional computer transistors, on the other hand, connect on average to four other transistors in a static pattern.

Computer design has drawn from neuroscience before, but an explosion in neuroscience research in recent years opens more possibilities. While it's far from a complete picture, Murat says what's known offers "more guidance in terms of how neural systems might be representing data and processing

information" and clues about replicating those tasks in a different structure to address problems impossible to solve on today's systems.

Brain-inspired computing isn't the same as artificial intelligence, although a broad definition of artificial intelligence could encompass it.

"Where I think brain-inspired computing can start differentiating itself is where it really truly tries to take inspiration from biosystems, which have evolved over generations to be incredibly good at what they do and very robust against a component failure. They are very energy efficient and very good at dealing with real-world situations. Our current computers are very energy inefficient, they are very failure prone due to components failing, and they can't make sense of complex data sets," Murat says.

Computers today do required computations without any sense of what the data is — it's just a representation chosen by a programmer.

"Whereas if you think about neuro-inspired computing systems, the structure itself will have an internal representation of the datastream that it's receiving and previous history that it's seen, so ideally it will be able to make predictions on what the future states of that datastream should be, and have a sense for what the information represents," Murat says.

He estimates a project dedicated to brain-inspired computing will develop early examples of a new architecture in the first several years, but says higher levels of complexity could take decades, even with the many efforts around the world working toward the same goal.

"The ultimate question is, 'What are the physical things in the biological system that let you think and act, what's the core essence of intelligence and thought?' That might take just a bit longer," he says.

Science Café talk focuses on the promise of protocells

By Stephanie Holinka



CHRIS LINO

Chris Lino, a post-doctoral Fellow at Sandia's Biological and Materials Science Center, told a standing room-only crowd at KNME Science Café that a new class of hybrid nanoparticles is being brought to bear in the fight against deadly cancers.

At Sandia, Chris has applied his background in nanomedicine to develop hybrid nanoparticles called protocells, which share the same outer structure as the living cells on which they are based. The lipid layer surrounding a porous silica nanoparticle can help it store, carry, and be guided to deliver therapies to places they're needed. The surface layer can be modified to target specific cancers and to release the protocell's contents once it reaches a specific type of cell.

Chris' work at Sandia is done in partnership with UNM Cancer Center.

Currently, Chris said in his presentation, cancer treatments have focused on delivering drugs systemically, to whole bodies, which is a problem because the drugs used to treat cancer are often toxic to healthy cells.

Protocells, by contrast, can be customized by their size and their outer layer

characteristics to target specific types of cancers, and to deliver medicines to specific areas. The amount of medicine used to treat a patient could be greatly reduced, in part because the numbers will be a specific function of the number of cancer cells that need to be treated.

Chris said the work is moving from its earliest stages, when experiments are done in petri dishes, to the next stage, when researchers study biocompatibility, and must demonstrate not only the effects on cancer cells, but whether the treatments also affect cells that aren't being targeted for treatment.

"If the treatment kills liver cancer cells, that's great. But if it also kills off healthy cells in a way that the body can't recover from, that's not great," he said.

New Mexico PBS' monthly Science Café meets at various locations such as Los Poblanos, The National Museum of Nuclear Science & History, and the KNME Studios, usually on the last Saturday of the month.

The Café opens with clips from an episode of science-based PBS programming such NOVA, NOVA scienceNOW, the Online NewsHour Science Reports, Nature, Frontline, or a comparable program. Then a subject matter expert gives a brief talk, followed by questions and open discussion with the audience.

The audience ranges from 50-80 people, who usually come prepared with questions that contribute to a lively discussion on often complex subjects.

The last Café for the summer will be Saturday, July 28, at the Bradbury Science Museum in Los Alamos. To be added to the Science Café mailing list, email NMPBS' Rose Poston rposton@newmexicopbs.org.

Sandia National Labs/Lockheed Martin supports the NMPBS/Science Café series as well as NMPBS' Science Central website.

Planting the ‘SEEDS’ of solar technology in the home

By Mike Janes

In an effort to better understand what persuades people to buy photovoltaic (PV) systems for their homes, Sandia researchers are gathering data on consumer motivations that can feed sophisticated computer models and thus lead to greater use of solar energy.

A primary goal of the project is to help increase the nation’s share of solar energy in the electricity market from its current share of less than 0.05 percent to at least 14 percent by 2030. This is the second year of a three-year effort.

“If we can develop effective and accurate predictive models, we can help identify policy variables that could increase purchases of residential PV systems and ultimately help advance the mission of the SunShot Initiative,” says Kiran Lakkaraju (1462), Sandia’s project lead. Specifically, he said, an effective model of solar purchase dynamics can be used to predict and even influence consumer purchasing decisions.

The modeling project, part of the Solar Energy Evolution and Diffusion Studies (SEEDS) program, is one of many activities in the Energy Department’s SunShot Initiative, which seeks to make solar energy cost-competitive with other forms of electricity. SEEDS projects are designed to investigate methods for transforming the operations of solar researchers, manufacturers, developers, installers, and policymakers.

The projects were discussed at a May 22 workshop at DOE’s SunShot Grand Challenge Summit in Anaheim, Calif.

Sandia’s solar energy program includes deep research and development in areas such as PV systems, concentrating solar power, grid integration, and solar codes and standards.

Sandia’s approach is to collect and analyze large amounts of data, says Jerry McNeish (8954), manager of the quantitative modeling and analysis group. The information has led to two models, one that predicts how likely an individual is to buy a PV system and one that predicts how long that individual will take to make the investment.

Working with project partners at the National Renewable Energy Laboratory (NREL) and the California Center for Sustainable Energy (CCSE), project researchers are conducting surveys of consumers in San



BRIGHT IDEAS — Sandia researcher Kiran Lakkaraju leads a modeling project that supports the goals of the Department of Energy’s SunShot Initiative. The work aims to create a model that predicts household solar energy system purchases based on such variables as price, energy savings, environmental concerns, and other factors. (Photo by Randy Montoya)

Diego County, including 1,000 respondents who have bought PV systems and another 1,000 who have not. Data from the surveys will be studied by Sandia and Vanderbilt University quantitative modeling experts and fed into modeling tools.

CCSE leads the market characterization of the San Diego regional solar market, including focus groups, pilot programs, and field testing of messages.

Experiments analyze effectiveness of incentives, framing of messages

Additional data is being collected for the Sandia project via a field experiment conducted by collaborator the Vote Solar Initiative, which will analyze how consumers respond to economic incentives, discounts, and even peer effects when friends, family, or co-workers purchase PV systems.

Another experiment, conducted online by the Wharton School at the University of Pennsylvania, is exploring how the framing of messages can influence whether consumers will invest the time to learn more about installing PV systems. Researchers will examine how different demographic segments are influenced by

messages and will study the influence of such issues as environmental awareness, energy independence, information about life events, and how messages are received.

Other predictive variables, including the square footage of homes, the national unemployment rate, and even seemingly inconsequential factors, such as whether consumers own a swimming pool, are also part of the models.

“We’re essentially creating a model that predicts household solar energy system purchases based on such variables as price, energy savings, environmental concerns, and other factors,” says Kiran. “But then we’re also running experiments that feed results back into the model. We have a cycle where we use the model to test and generate hypotheses about solar panel purchases, but then we test these hypotheses through experiments to improve the model.”

The Sandia-developed models, Kiran says, have already predicted purchasing behavior 200 percent to 500 percent more effectively than current models.

The team also is investigating novel financing structures that go beyond straightforward “purchases,” such as third-party ownership through leasing or power purchasing agreements. These aren’t strictly purchases, yet are seen as key to the industry’s growth, Kiran says.

The research team will test its modeling tools, recommendations, and draft guidance on using the models in additional field experiments.

“The significance of this work is that it will help identify those likely to purchase PV systems and help forecast future market trends,” says Kiran. “Ultimately, it will help those in the solar industry to more effectively bring solar energy to consumers.”



High school girls honored for math, science achievements

By Patti Koning

Sandia/California recently presented its annual Math and Science Awards to 27 girls from area high schools, celebrating their academic accomplishments and potential.

“For more than two decades, Sandia has recognized young women from various public schools for academic excellence,” said Div. 8000 VP Steve Rottler. “Studies show that the transition between high school and college is a critical point when many girls turn away from science, technology, engineering, and mathematics subjects. Through this program, we hope to highlight your potential in these subjects and introduce you to a number of successful women scientists and engineers.”

Now in its 23rd year, the Math and Science Awards program is sponsored by the Sandia Women’s Connection. This year’s event honored more students, with the addition of four high schools in Oakland, Calif., and included recognition of the students by federal and state officials.

Teachers from 15 high schools in Livermore, Dublin, Pleasanton, Tracy, Manteca, and Oakland nominated high school juniors whom they deemed outstanding in math and science, so the students can include the award on college and scholarship applications.

At the May 21 ceremony, awardees and their families discussed careers in math and science with Sandia leaders and female researchers. Two Sandia researchers, mathematician Lindsay Erickson (8365) and mechanical engineer Jackie Chen (8351), shared their personal stories at the podium.

“Looking back to high school, I don’t think I even knew jobs like these existed,” said Lindsay. “My advice is that it is OK to fail, and be sure to ask your teachers plenty of questions.”

Jackie encouraged the award recipients to think broadly and pursue more than one discipline. “The most interesting work is at the intersection of multiple disciplines,” she said. “In my work as a computational combustion researcher, we seek to understand chemistry, turbulence, and reactive flows, and incorporate that



RENAE PRESTON, a student at East Union High School, is all smiles after receiving her award for outstanding achievement in science at Sandia’s 23rd annual Math and Science Awards.

knowledge into developing future fuel-efficient, clean-burning engines. This draws upon computer science, fluid dynamics, chemistry, and applied math.”

Malin Young, director of Biological and Materials Sciences Center 8600, handed out the awards. The honorees also received certificates of achievement from Cheri Greven, representing US Rep. Eric Swalwell; Michael Anderson, representing US Rep. Jeff Denham; and Gayle Larson, representing Assembly member Joan Buchanan. US Rep. Barbara Lee and state Sen. Mark DeSaulnier gave certificates to the recipients in advance.

“This is such a great event. It’s a real honor to be recognized,” said Sraavya Kakarlapudi, science award recipient from Dublin High School. “The speakers were very impressive and inspiring.”

Parents and teachers who attended praised the award and event. “As a parent, it’s nice to see my daughter and these other young women recognized and

rewarded for their hard work,” said Kenneth Preston, father of Renae Preston, the science winner from East Union High School in Manteca, Calif. “It’s great for them to learn about so many different career possibilities.”

The winners of the 2014 Sandia Math and Science Awards:

Outstanding Achievement in Science
Megan Gupta, Amador H.S.; Sandra Vivian, Castlemont H.S.; Malia Lapota, Coliseum College Prep Academy; Sraavya Kakarlapudi, Dublin H.S.; Renae Preston, East Union H.S.; Katie Liu, Foothill H.S.; Rosa Contreras, Fremont H.S.; Vanessa Valenti, Granada H.S.; Kristen Young, Livermore H.S.; Hannah Hallikainen, Livermore Valley Preparatory H.S.; Bianca Arao, Manteca H.S.; Brianna Sandoval, Merrill F. West H.S.; Nicole Arteaga, Sierra West H.S.; Abigail Wong-Rolle, Skyline H.S.; Makaela Bournazian, Tracy H.S.

Outstanding Achievement in Math
Cynthia Chen, Amador H.S.; Sophia Hui, Dublin H.S.; Tabatha Barrington, East Union H.S.; Suman Tripathy, Foothill H.S.; Carmen Jimenez, Fremont H.S.; Morgan Correia, Granada H.S.; Megan Kristovich, Livermore H.S.; Andrea Ludwig, Livermore Valley Prep. H.S.; Emily Ritter, Manteca H.S.; Emily Wittkowske, Merrill F. West H.S.; Maleny Calderon, Skyline H.S.; Ameryl Loi, Tracy H.S.

Sandia Classified Ads **Sandia Classified Ads** **Sandia Classified Ads** **Sandia Classified Ads**

MISCELLANEOUS

MOVING SALE, bookcase, shop vac, blower, misc. yard tools. Brown, 220-8823.

ORGAN, Lowrey MX-2, \$2,500 OBO. Kettleborough, 293-4503.

SECTIONAL, microfiber, double recliner, \$400 OBO; washer, Whirlpool, has new pump, dryer needs fuse, \$120 OBO/both. Ebell, 264-2787.

ROCKING BABY BASSINET, w/night light & music, neutral color, excellent condition, \$40. Martinez, 702-6767.

MALTESE/BICHON FRISE PUPPIES, born May 26, located in Bernalillo Co., \$300. Romero, 505-306-8815.

ESTATE SALE, entire house full of furniture, kitchen, dining, bedroom, living room, desks, all must go. Mozley, 884-3453.

GOLF CLUBS, Wilson, w/stand-alone bag, call for details, \$800 OBO; 2 end tables, coffee table, together/separate, metal, glass top, \$150 OBO/set, end tables, \$45 ea., coffee table, \$60. Riffenburg, 505-681-6125.

MATTRESS SET, queen, Tempurpedic, good condition, \$400; large rug, 8' x 10', brown & tan, \$50. Mauger, 505-730-6554.

GAS GRILLS, 5-burner w/tank, won't light, \$10; 1-burner, working, free; steel scaffolding, 4 ends, 2 braces, no plank, \$25. Kerschen, 821-2848.

FULL POTTERY STUDIO SETUP: kiln, wheel, clay, tons of extras, in Tijeras, you pick up, \$1,500. Couto, 281-8757.

ENTERTAINMENT CENTER, oak, \$50; golf bag wheels, \$10; couch, \$50; loveseat, \$50 OBO. TenClay, 505-294-4942.

'64 ALLIS CHALMERS TRACTOR, needs tune up, w/brush hog & box blade, \$1,800 OBO. Tallant, 286-1598.

FORD FACTORY RIMS, from '10 F150, 6-lug pattern, \$200 OBO. Lindstrand, 259-0375.

MEN'S DRIVER, Fairway, & hybrid clubs, call for price; ladies golf set, irons & hybrids, \$100. Sabo, 904-803-1911.

BATHROOM VANITIES & SINKS, 2 sets, IKEA, w/wall cabinets, assembled, never used, <http://bit.ly/1x3bPpJ>, \$275/\$315. Barker, 730-7532.

HAYNES SERVICE MANUAL, for Honda ST1300, \$10; TEMA sling chair, black/beige, like new, \$50. McDonald, 554-2048.

STEEL STRING GUITAR, Yamaha, model F-310, new condition, \$125; electronic keyboard, model PSR-175, \$65. Aragon, 888-3473.

FURNITURE, cherry, 3-dr. china cabinet, \$800; round table, w/2 leaves, 6 chairs, \$300; coffee table, \$250. Wells, 292-0179.

DINING SET, TEMA-style, teak, draw-leaf table, 51" x 33-1/2", w/2 19-1/2" self-storing leaves, 4 matching chairs, w/neutral Southwest print, \$300. Caskey, 298-6428.

SADDLES, County Competitor dressage saddle, 17-in. seat, wide tree, \$600; hand-made Martha Wright barrel saddle, 14-in. seat, aluminum stirrups, \$400; both good condition. Kirschner, 866-0232.

GOLF SET, Tourline III U-Grove, 3 iron to PW, driver: 3-4 woods, \$75; HP 6500 fax/scan printer, w/new cartridge, \$75. Garcia, 280-5815.

TRANSPORTATION

'06 TOYOTA TACOMA XRUNNER, 4.0L, V6, 6-spd. manual, all power, 103K miles, excellent condition, \$13,500. Williamson, 977-2420.

'02 FORD EXPLORER XLT, 4WD, V6, loaded, leather, 3rd row seat, original owner, 94K miles, \$5,600. Sleaf, 281-4103.

How to submit classified ads
DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:
• **EMAIL:** Michelle Fleming (classads@sandia.gov)
• **FAX:** 844-0645
• **MAIL:** MS 1468 (Dept. 3651)
• **INTERNAL WEB:** On internal web homepage, click on News Center, then on *Lab News* link, and then on the **very top of Lab News homepage** "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.

- Ad rules
1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
 2. Include organization and full name with the ad submission.
 3. Submit ad in writing. No phone-ins.
 4. Type or print ad legibly; use accepted abbreviations.
 5. One ad per issue.
 6. We will not run the same ad more than twice.
 7. No "for rent" ads except for employees on temporary assignment.
 8. No commercial ads.
 9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
 10. Housing listed for sale is available without regard to race, creed, color, or national origin.
 11. Work Wanted ads limited to student-aged children of employees.
 12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

'06 HONDA CIVIC, 5-spd. manual, MP3 player, 103K miles, new clutch, PP, TOB (6/6/14), \$8,000 OBO. Kill, 281-5591.

RECREATION

'03 KAWASAKI VULCAN 1600, highway ready w/windshield, saddlebags, Mustang seat, more, 34K miles, \$4,017 OBO. Young, 934-5538.

'02 KAWASAKI ZX12R NINJA, excellent shape, new tires, brakes, chain & sprockets, work stand & helmet w/jacket, \$3,900 OBO. Merriken, 505-897-1320.

REAL ESTATE

1.1 ACRES, mountain property, w/private lake, breathtaking views, water onsite, electricity 100-ft. away, \$26,500 OBO. Sandoval, 792-7883.

4-BDR. HOME, 2-1/2 baths, 2,777-sq. ft., formal living & dining, family room, loft, 2-story, enclosed hot tub, back & side yard access, will consider REC, MLS#806686. Maestas, 505-459-7650.

INVESTMENT PROPERTIES, 2.36 acres, commercial, Edgewood, MLS#810490, \$229,000; 25.5 acres, residential, Tijeras, MLS#811422, \$382,500. Dotson, 850-2939.

4-BDR. HOME, 2-1/2 baths, refrigerated AC, 10 mins. to Sandia, Foothills, \$390,000. Tomlinson, 298-1632.

2-BDR. ADOBE HOME, w/office, 2 baths, 2,667-sq. ft., brick & hardwood floors, beautiful courtyard, views, Cedar Crest, 2 acres, MLS#814925, \$430,000. Sackinger, 269-7171.

2/3-BDR. HOME, 2 baths, 1-car garage, 1,000-sq. ft., wood floors, tile, excellent starter home, Southwest Albuquerque, \$114,999. Martinez, 362-4058.

5-BDR. HOME, 3 baths, 3-car. garage, 3,016-sq. ft., granite countertops, new stainless appliances, www.1323narcisco.com, \$450,000. Hensley, 505-298-2766.

3-BDR. HOME, 2-1/2 baths, office, 2,056-sq. ft., N. Star/La Cueva, built 2005, NE Heights, MLS#816310, \$274,900. Chang, 385-6158.

4-BDR. HOME, 3-1/2 baths, 2,086-sq. ft., great yard, new flooring, Volterra subdivision, minutes from Sandia, MLS#816122. Pena, 505-573-7338.

3-BDR. HOME, 2 baths, 1,100-sq. ft., Southwest area, move-in ready, well taken care of, \$107,000. Ewen, 836-3563.

WANTED

GOOD HOME, male Beagle, 4-1/2 yrs. old, adorable, playful, obedient, crate/house trained, good w/kids. Howard, 505-280-6368.

GOOD HOME, 3-yr.-old male family dog, 30-lbs., good w/kids/cats/dogs, house/crate/leash trained, knows basic commands. Meyer, 449-8708.

HOUSE SITTER, while I'm on vacation, light maintenance, yard work, looking for student intern/summer hire. Appel, 505-750-8410.



Case study: Identifying and safely controlling energy sources

By Sue Major Holmes

It's the kind of interesting problem often faced by Sandia's Explosive Technology Group: how to safely work with a device carrying explosive powder.

The operation required soldering wires onto a tiny detonator already loaded with the powder. The heat from soldering had to be controlled so it would not heat the powder to the point it would detonate.

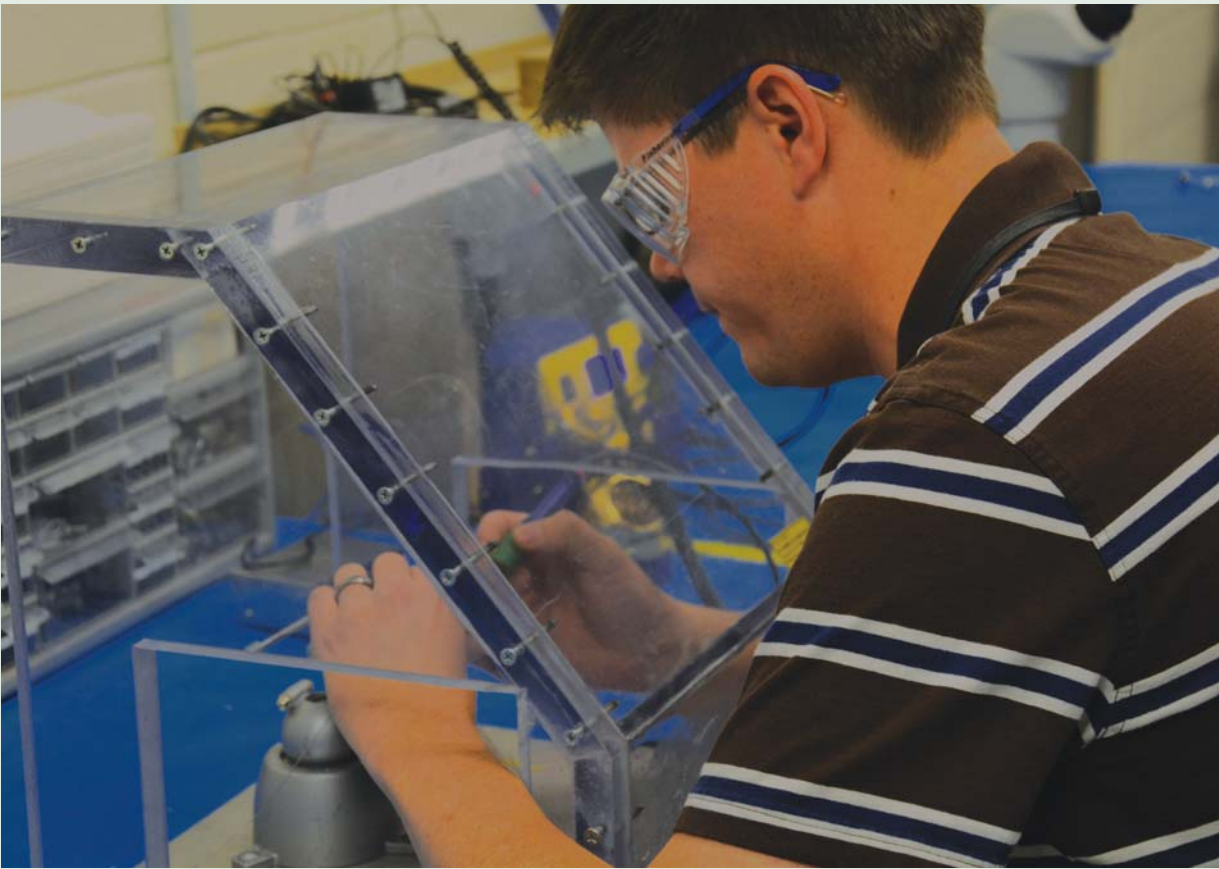
Center 2500 staff and managers determined the work was Category 3, the highest hazard performed at the Explosive Components Facility, because of the non-standard device, the requirement to solder it after explosives were loaded, and installing explosives with the firing system attached and not isolated.

To ensure safety during assembly, the team did an Engineered Safety analysis to identify and control the energy sources, which meant considering the inherent safety of the device, then mitigating the effects of any inadvertent detonation. They:

- removed the battery during assembly, checked the capacitor charge twice before assembly, with the fireset designer present during the first assembly;
- performed a thermocouple study on an unloaded device to understand the heat profile the explosives would see due to soldering to ensure the device would not detonate;
- and performed the work behind a blast shield so even an inadvertent detonation left no potential for injury.

"If something happens that you don't expect, you mitigate it so the overall operation is safe by design intent. Once you've identified that this could happen or that could happen, you mitigate it so one inadvertent failure would not cause the operator to be harmed," Center 2500 Director Anthony Medina says.

The project required critical thinking, analysis and evaluation, and walking through all the steps before the actual operation. Anthony says the Explosive Technology Group's management and staff follow this



ENGINEERED SAFETY — Cody Love (2552) performs intricate work protected by a blast screen. Sandia's Explosive Technology Group did Engineered Safety analyses to determine how to safely work with a device carrying explosive powder.

path for the approximately 150 operations they perform each year — a level of formality and scrutiny necessary to ensure safe operations.

Org. 2550 received recognition for its attention to safety in its portion of the project.

Anthony says Engineered Safety is not a replace-

ment for the Work Planning and Control process, but rather "a needed enhancement that follows Sandia's principles used to provide safe nuclear weapons. Engineered Safety requires people to understand how a device may fail and to mitigate those circumstances so that if it does fail, it fails in the known safe state."

Forty Under 40 x 2

Pursuit of science had a hair-raising start

Stories by Nancy Salem

Karen Gutierrez remembers the moment everything changed. She was 7 years old wide-eyed in a movie theater watching *Jurassic Park*. “When I got over the shock of the dinosaurs eating people I realized I loved the part where they were digging in the desert uncovering dinosaur bones,” she says. “I wanted to be a paleontologist.”

She didn’t keep digging, but is building a career as a geotechnologist at Sandia. “I love it,” she says. “I’m constantly learning new things.”

Karen (6912) was named to the 2014 class of Albuquerque Business First’s Forty Under 40, which recognizes young people who stand out professionally and in the community. And at the June 5 awards gala she was named the outstanding honoree under age 30. “I was totally caught off guard, completely shocked and honored,” she says. “The recognition means so much to me, and looking at the other honorees, it’s just staggering. I know some of them and the incredible work they do, and to be associated with them is incredible.”

Karen, 27, is a Santa Fe native who was raised in Albuquerque. She graduated from Albuquerque Academy in 2004 and won a Presidential Scholarship to Southern Methodist University in Dallas to study paleontology. She earned a bachelor’s degree with a triple major in geology, math, and Spanish.

In her senior year she heard about the Master’s Fellowship Program at Sandia, applied, and was accepted. “The only caveat was that I needed to study something relevant to Sandia, not paleontology,” she says. “I had a background in geology so went in that direction.”

Karen worked in the geophysics department while pursuing a master’s degree in geology from the University of Michigan. As a geosciences engineer at Sandia she has worked on a Bureau of Land Management potash project and with the Strategic Petroleum Reserve. “I do subsidence monitoring for the caverns, and maintain and store incoming data,” she says.

She balances work with community activities. She is event co-chair for the American Cancer Society’s Relay for Life, the organization’s primary annual fundraising

event. This year’s 16-hour walkathon will be Aug. 1-2 at La Cueva High School.

“Cancer never sleeps, so for one night neither will we,” Karen says. Last year, when she also was co-chair, the event drew more than 600 participants and raised \$130,000. She was drawn to the Cancer Society because she lost her grandmother to the disease while a senior in high school. “We were very close,” Karen says. “Her death had a huge impact on me.”

Planning for the Relay for Life takes all year. “It’s a lot of work,” Karen says. “But it is very rewarding.”

She’s also a member of the Future Fund, the young professionals’ arm of the Albuquerque Community Foundation, which evaluates and awards \$15,000 in grants annually. Karen also does STEM (science, technology, engineering, and math) outreach to elementary and middle school kids, and mentors Sandia interns through a Sandia Women’s Action Network program.

Her former senior manager, John Merson, now senior manager of Stockpile Transformation Dept. 2810, says Karen has done excellent work as the next generation of support for the Strategic Petroleum Reserve. “But the thing that really impresses me is her community involvement and work with the Relay for Life,” he says. “She has an exciting future technically and in the community.”

For fun Karen does hot yoga and is raising a puppy. She’s also planning a summer wedding in Santa Fe. “I’m a firm believer in having balance in life,” she says. “I’m very pleased with the work I do but also want to give back in a tangible way. Sandia gives me the opportunity to do that. Through community work I can network and brainstorm and keep moving. It helps me at my job. It keeps me growing.”

And her love of dinosaurs lives on in the dozens of Tyrannosaurs, Velociraptors, Stegosaurus, and Triceratops, plastic only, that share her office. “I love going to the natural history museum and I have three nephews who are getting into the sciences. I’m teaching them all about it,” Karen says. “People know they can get a rise out of me by talking about dinosaurs.”



KAREN GUTIERREZ (6912) turned a love of dinosaurs into a career in geosciences engineering. “I’m a firm believer in having balance in life,” she says.



Career and community go hand in hand

Cassandra Reckaway has a personal goal of lifelong learning. “I learn something new every day,” she says.

And she has a passion for community volunteerism. Cassandra (10599) works in her spare time for a list of nonprofits addressing social needs. “I’ve learned success is about who you are as a person and what impact you’ve had on others,” she says.

Her professional accomplishments and community involvement earned Cassandra a spot on Albuquerque Business First’s 2014 Forty Under 40. Cassandra, 26, says she was surprised to be named to the list of the city’s top young professionals. “It’s not something I expected at this point in my life,” she says. “I’m humbled to be named alongside some very influential and giving young professionals who I look up to as role models.”

Cassandra grew up on Isleta Pueblo and attended Los Lunas High. She didn’t have a major in mind when starting college but soon found her calling at the University of New Mexico Anderson School of Management. She earned a bachelor’s degree in business administration in 2010 with concentrations in operations and marketing management.

While in school she was a business intern in Sandia’s intellectual property group and was later hired as an administrative support associate in Center 1400. She went on to earn a master’s in business administration in 2012 with a concentration in policy and planning, working and in school, both full time, for more than a year.

“Looking back, I don’t know how I did it,” she says. “I worked all day and was in school most of the evening. It was one of the hardest things I have ever done, but it was so rewarding.” She says her manager was supportive throughout the process. “That support really encouraged me to complete the MBA,” she says.

She says work and school complemented each other. “I could leave class and apply what I’d learned at



CASSANDRA RECKAWAY (10599) says she has had great mentors and supportive managers at Sandia. “The mentoring culture here helped me become one of the Forty Under 40,” she says. “Now it is my responsibility to continue that tradition and be a mentor to others.”

work,” she says.

Cassandra is now a senior business management professional supporting Center 9500. “I’m a center business administrator,” she says. “I provide business operations support to help my customers make decisions and achieve their business goals.”

Outside work Cassandra is a member of Young Professionals of Albuquerque and sits on its marketing and membership committees. The organization supports a different nonprofit, such as the Storehouse of Albuquerque, each quarter through civic engagement projects. “We help them fundraise or volunteer at their sites,” she says. “We try to help as many people as we can and have an impact each quarter.”

Cassandra is on the board of the UNM Young Alumni Association and a member of the Chi Omega sorority, which supports the national Make-A-Wish Foundation. She’s in a local Lean In Circle of women who meet to develop leadership skills and share insights. She is a member of the Albuquerque Hispanic Chamber of Commerce and the New Mexico Angels, and has been a judge for the Business Professionals of America State Leadership Conference. For fun she plays in a kickball league that raises money for local nonprofits.

Cassandra’s manager, Sandy Varro (10599), says she embodies the essence of a future leader. “She’s passionate, selfless, and gives back to the community,” Sandy says. “Cassandra was my first hire as a manager and there is no doubt that I will remember her long after our careers take us to new experiences. I am extremely proud of her being recognized as a Forty Under 40.”

Cassandra credits her parents, who both work at Sandia, with sparking her passion for community work. “Before I had my first job, my parents would drive me to Presbyterian Hospital or to the South Valley Library so I could spend my Saturdays volunteering,” she says. “My parents taught me how community involvement is an important part of being a successful individual.”